FINAL

FIELD SAMPLING PLAN FOR

SURFACE WATER AND SEDIMENT

OF THE
CAMP EDWARDS IMPACT AREA
GROUNDWATER QUALITY STUDY

MASSACHUSETTS MILITARY RESERVATION
CAPE COD, MASSACHUSETTS

Prepared for
NATIONAL GUARD BUREAU
ARLINGTON, VIRGINIA

Prepared by

OGDEN ENVIRONMENTAL AND ENERGY SERVICES
239 Littleton Road, Suite 1B
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DISCLAIMER:

This document has been prepared pursuant to a government administrative order (U.S. EPA Region I SDWA Docket No. I-97-1019) and is subject to approval by the U.S. Environmental Protection Agency. The opinions, findings, and conclusions expressed are those of the authors and not necessarily those of the Environmental Protection Agency.

A.8 Surface Water and Sediment Field Sampling Plan

A.8.1 Background and Focal Area(s)

Nineteen surface water bodies that are deep enough to intersect ground water or appear to receive storm water runoff have been selected for surface water and sediment sampling. The ponds, swamps and bogs include Succonsette Pond, Bailey's Pond, Round Swamp, Raccoon Swamp, Great Pond, Doughnut Pond, Upper Pond, Gibbs Pond, Grassy Pond, Ox Pond, By-Pass Bog, a wetland area south of J-3 Range, Opening Pond, Rod and Gun Club North Pond, Donnely Pond, Little Halfway Pond, Deep Bottom Pond, the Cranberry Bog, and Snake Pond. The ponds, swamps and bogs will be investigated as possible conduits and areas of compound accumulation. Raccoon Swamp, Great Pond, Doughnut Pond, and Upper Pond were identified as potential background sampling locations based on their isolation from known contaminant plumes or source areas at MMR. Sampling at these four ponds is also described in the Final Background FSP (1/9/98). Pond and swamp locations are presented in Figure A.8-1.

Each surface water body was evaluated for primary inlets and outlets, which would serve as focal areas for sampling. These areas and any historical information for the ponds are described in the following paragraphs.

- **Succonsette Pond** is located within the southwest corner of the Impact Area. The 1-acre pond is in the bottom of a kettle hole. The depth of standing water is unknown. The pond is nearly round and no primary inlets to or outlets from the pond have been observed.

  According to the Range Use History Report, potential impacts may include influence from mortar firing at targets within the impact area, east and northeast of Succonsette Pond. Reportedly, 55-gallon drums were observed in the vicinity of this pond. The drums may have been used as targets for 50-caliber machine guns.

- **Bailey's Pond** is located along Burgoyne Road a few hundred yards north of the intersection of Burgoyne Road and Wood Road. There is water in the pond with areas of reeds and grass growing in the center. Storm water runoff may accumulate in the northern portion of the pond. No other inlets to or outlets from the nearly 1-acre pond have been observed. According to the Range Use History Report, dumping may have occurred at Bailey's Pond. A local resident reportedly discovered an artillery projectile, powder bags, and 50 caliber ammunition. The area of suspected dumping is on the southeast side of the pond.

- **Round Swamp** is located north of the intersection of Burgoyne Road and Jefferson Road.

The half-acre swamp appears to receive runoff from Jefferson Road. Two sets of silt fences were observed in the drainage/erosion channel on the southwest corner of the swamp. Vegetation in the swamp is mostly blueberry and briar. Little standing water was observed during the reconnaissance in September, 1997, but evidence of frequent inundation was observed. A flat low-lying area on the north side of the swamp may be an overflow plain. The swamp is surrounded by high ground on the east, west, and south sides.

- **Raccoon Swamp** is located approximately 3000 feet north of Gibbs Road, near the northern boundary between MMR and Shawme Crowell State Forest. This swamp consists of multiple small ponds draining to a single area approximately 100 by 50 feet. There are no observable outlets from this receiving basin. This is a background sampling location.

- **Great Pond** is located approximately 2000 feet west of MMR, on the east side of Route 28 and about 300 feet from the highway. This pond receives runoff from the vicinity of Route 28. There are no observable outlets from this pond. This is a background sampling location.

- **Doughnut Pond** is located approximately 1000 feet north of MMR between Routes 130 and 6. There are no observable inlets to or outlets from this doughnut-shaped pond. This is a background sampling location.

- **Upper Pond** is located approximately 3700 feet west of MMR in the Four Ponds Conservation Area in Bourne. This pond has an inlet at the eastern end, and drains through a culvert to Freeman Pond at the west end. This is a background sampling location.

- **Gibbs Pond** is located north of Gibbs Road across from the entrance to the 'U' Range. Gibbs Pond has an approximate depth of 1-foot. This area receives runoff from the tank trail, which parallels Gibbs Road to the north of the pond. No outlets from the half-acre pond have been observed. High-tension power lines are located directly north of Gibbs Road, passing over Gibbs Pond.

  According to the Range Use History Report, around 1980, defoliants were applied along the power line right-of-ways by Gibbs Road. Also according to this report. Prior to 1974, the Army applied pesticides by truck in low areas near Gibbs Road.

- **Grassy Pond** is located south of Gibbs Road and east of the access road to 'S' Range East. The center of the half-acre pond has standing water after precipitation. The majority of the pond area has mounds of grass in it. This feature receives storm water via culverts along Gibbs road. Silt fences were observed in the culverts. No apparent outlet was observed from Grassy Pond. High-tension power lines are located directly north of Gibbs Road.

According to the Range Use History Report around 1980, defoliants were applied along the power line right-of-ways by Gibbs Road. Also according to this report, prior to 1974, the Army applied pesticides by truck in low areas near Gibbs Road.

- **Ox Pond** is located northeast of the impact area off of Whip Road. Ox Pond is nearly an acre with an unknown water depth. Mud flats were observed on the north side of the pond and extend to the north/northwest. No apparent inlets or outlets were observed. Storm water runoff likely enters the pond from a hill on the east side.

- **By-Pass Bog** is located northwest of Snake Pond and east of Greenway Road. Old Greenway Road, which extends east from the intersection of Greenway and Pocasset Forestdale Roads, borders the bog on the south and east sides. Standing water was observed below the level of bog vegetation at the time the reconnaissance was conducted, in September, 1997. The 2.4-acre bog is surrounded by high ground on all sides. No apparent inlets or outlets were observed. This depression was identified for sampling in the July 1997 Final Action Plan, as a potential drainage area for the southeast side of the Impact Area.

- The **Wetland Area South of J-3** is located southeast of the impact area in a low area south of J-3 just outside the MMR Boundary. The 9-acre area has standing water just below the bog vegetation. There were three low areas, on the north, west, and east sides, which appeared to receive storm water from surrounding high areas. This depression was identified for sampling in the July 1997 Final Action Plan, as a potential drainage area for the southeast side of the Impact Area. Reportedly there is an area of stressed vegetation on the southeast side of this wetland.

- **Opening Pond** is located near Pocasset and Forestdale Roads. The 0.7-acre pond is down range from Range "G". It is approximately 600 feet northwest of the parking area for Range "G". High ground and dense vegetation surround Opening Pond. No inlets or outlets were observed.

- **Rod and Gun Club North Pond** is located southwest of the impact area and is situated in the Rod and Gun Club area about 100 feet east of the entrance road. A swampy area southeast of the pond appears to feed the 8-acre pond on its southeast side. The pond has standing water and no outlets. Reportedly, water purification training was conducted at the two ponds on the Rod and Gun Club. Utility companies used defoliants/herbicides along power line right-of-ways along the western boundary of MMR, about 100 feet west of this pond.

- **Donnely Pond** is located west of the impact area. It is a 3-acre pond situated between Canalview Road and a tank trail. Donnely pond is full of water and is surrounded by high

ground on all sides. No outlets were observed. Erosion from the tank trail and power line cut east of the pond is significant and silt fences are in place.

According to the Range Use History Report, utility companies used defoliants/herbicides along power line right-of-ways along the western perimeter and northern portion of the Training Ranges and Impact Area.

- **Little Halfway Pond** is located west of the impact area, northeast of Donnely Pond. The 0.7-acre pond sits in a kettle hole. A low area at the southwest corner of the pond appears to contribute runoff to the pond. No outlets were observed.

  According to the Range Use History Report, utility companies used defoliants/herbicides along power line right-of-ways along the western perimeter and northern portion of the Training Ranges and Impact Area.

- **Deep Bottom Pond** is located northwest of the intersection of Deep Bottom Pond Road and Avery Road. Erosion along the southeast approach from Avery Road and the northeast approach from Deep Bottom Pond is significant. Silt fences are in place in those areas. Two roads cross the pond from east to west, making three pond sections. Water was observed in all three however, the southern most pond was silted-in more than the other two. An outfall pipe connects the pond and the depression east of the road that has a bridge-like wood structure in it. This location also receives runoff from the road. No other apparent outlets were observed in the 1.5-acre pond.

  According to the Draft Range Use History Report, Deep Bottom Pond was historically used for water purification training. The pond is designated as a Water Training Site on a 1949 Range Map. Reportedly, around 1970, a water treatment training exercise was observed by a local resident. Boxes of water treatment chemicals were reportedly used for the exercise. Dredging reportedly occurred at the pond and dredge materials were dumped 50 yards to the north, although there is no soil pile visible in this area today. Defoliants may have been staged and used along the power line right of way west of Deep Bottom Pond. Water from the pond may also have been used for washing the defoliant spray trucks.

- The **Cranberry Bog** is located north of Deep Bottom Pond. Utility companies used defoliants/herbicides along adjacent power line right-of-ways. This bog may receive runoff from the power line right-of-ways. Three low areas that appear to receive runoff from storm events were observed, on the south, west, and north sides of the bog.

- **Snake Pond** is a large pond located to the southeast of the Training Range. According to the Draft Range Use History Report, during World War II, amphibious vehicle training was

performed at Snake Pond. This pond has been sampled extensively by AFCEE under the IRP activities, including nine surface water and sediment sample locations and eleven macroinvertebrate sample locations. Groundwater flow from the southeast portion of the study area may enter Snake Pond from the northwest side.

A.8.2 Sampling & Analysis Methods

Representative samples from each pond, swamp, and bog will be collected and analyzed for all constituents of concern in order to identify any impact training activities may have had on surface water or sediment, or to identify background concentrations. The sampling program is designed to characterize the water bodies during steady-state conditions, and sampling will occur irrespective of precipitation events. Transient conditions following major storm events may differ from these steady-state conditions due to many factors including storm water runoff, precipitation loading, and interaction with groundwater. Generally it is expected that sampling will be performed during dry weather, although it may also occur during minor precipitation events. Weather conditions at the time of sampling will be recorded.

At each surface water body, sample locations were selected at each primary inlet to the low area. At ponds where no primary inlets were identified, three representative sample locations were selected along the perimeter of the pond. Perimeter sample locations were chosen based on safe access, suspected influent drainage paths, groundwater flow direction, and proximity to potential source areas. If no standing water is present at the time of sampling, only soil/sediment will be collected. Soil/sediment samples will also be collected behind silt fences that in place around several water bodies. Sample locations are shown in Figures A.8-2 through A.8-19, and are summarized in Table A.8-1. Note that Figures A.8-2 through A.8-19 appear at the end of this sampling plan.

Table A.8-1. Summary of Surface Water and Sediment Sampling Locations

Surface Water Body	Figure Number	Sample Location	Description/Rationale
Succonsette Pond	A.8-2	08A	Perimeter location
		08B	Perimeter location
		08C	Perimeter location
Bailey's Pond	A.8-3	34A	Suspected dumping location on SE side
		34B	Perimeter location adjacent to Burgoyne Road
		34C	Northern low area that receives runoff
Round Swamp	A.8-4	27A	Receives runoff from Jefferson Road
		27B	Receives runoff from Jefferson Road

Surface Water Body	Figure Number	Sample Location	Description/Rationale
		27C*	Soil Sample from silt fence
Gibbs Pond	A.8-5	35A	Receives runoff from trails/transmission lines, Gibbs Road
		35B	Receives runoff from trails/transmission lines
Grassy Pond	A.8-6	28A	Receives runoff from Gibbs Road
		28B	Perimeter location
		28C	Perimeter location
		28D*	Soil Sample from silt fence
Ox Pond	A.8-7	29A	Receives runoff from east
		29B	Receives runoff from east
		29C	Receives runoff from east
By-Pass Bog	A.8-8	37A	Perimeter location
		37B	Perimeter location
		37C	Perimeter location
Wetland Area South of 'J3' Range	A.8-9	23A	Possible storm water inlet
		23B	Possible storm water inlet
		23C	Possible storm water inlet/stressed vegetation
Opening Pond	A.8-10	36A	Perimeter location
		36B	Perimeter location
		36C	Perimeter location
Rod & Gun Club North Pond	A.8-11	25A	Perimeter location near trails/transmission lines
		25B	Near swampy area
		25C	Perimeter location near trails/transmission lines
Donnely Pond	A.8-12	30A	Receives runoff from trails/transmission lines
		30B	Receives runoff from trails/transmission lines
		30C	Receives runoff from trail/transmission line
		30D*	Soil sample from silt fence
Little Halfway Pond	A.8-13	31A	Perimeter location near trail/transmission lines
		31B	Perimeter location
Deep Bottom Pond	A.8-14	26A	Middle third near runoff inflow
		26B	Northern third near runoff inflow
		26C	Northern third near outfall pipe
		26D	Southern third near Deep Bottom Pond Road
		26H*	Soil sample from silt fence
Cranberry Bog	A.8-14	26E	Receives runoff from southeast

Surface Water Body	Figure Number	Sample Location	Description/Rationale
		26F	Receives runoff from west near trails/transmission lines
		26G	Receives runoff from north near transmission lines
Snake Pond	A.8-15	33A	Perimeter location SE of J-3 Wetland
		33B	Perimeter location SE of Bypass Bog
		33C	Perimeter location SE of Bypass Bog
Raccoon Swamp	A.8-16	32A	Perimeter location (Background)
		32B	Perimeter location (Background)
Great Pond	A.8-17	39A	Perimeter location (Background)
		39B	Perimeter location (Background)
		39C	Perimeter location (Background)
		39D	Perimeter location (Background)
		39E	Perimeter location (Background)
Doughnut Pond	A.8-18	40A	Perimeter location (Background)
		40B	Perimeter location (Background)
		40C	Perimeter location (Background)
		40D	Perimeter location (Background)
		40E	Perimeter location (Background)
Upper Pond	A.8-19	43A	Perimeter location (Background)
		43B	Perimeter location (Background)
		43C	Perimeter location (Background)
		43D	Perimeter location (Background)
		43E	Perimeter location (Background)
		43F	Perimeter location (Background)
		43G	Perimeter location (Background)
		43H	Perimeter location (Background)

* = location for sampling only soil/sediment

Sample collection will be consistent with MMR SOPs, the Ogden Health and Safety Guidelines, Attachment A: Field Guide to High Explosives, and the EPA Standard Guide for Composite Sampling and Field Subsampling for Environmental Waste Management Activities (October 31, 1996). Every sediment sample with explosives detected by the colorimetric method will also be analyzed by EPA Method 8330. In addition to field samples identified in Table A.8-1, QA/QC samples will be collected as described in the Final Action Plan, Appendix A Quality Assurance/Quality Control Plan (July 1997), and the QA/QC Plan Addendum (August 1997).

The following protocol will be followed during surface water and sediment sampling at ponds

and swamps.

Surface Water Sampling

1. surface water will be collected prior to sediment sampling;
2. the sampler will enter the water downstream from the sample point and only if necessary;
3. the sample will be collected by submerging the sample containers
4. containers with preservative will be filled using a decontaminated stainless steel or glass container; and
5. Samples will be collected as listed in Table A.8-2.

Surface Water will be analyzed by the following.

VOC	OLC 02.1
Explosives	EPA Method 8330
Metals & Cyanide	ILM04
Pesticides/PCBs	OLC 02.1
SVOC	OLC02.1
Herbicides	SW-846 Method 8151
Hardness as CaCO3	130.1
Phosphorous	365.2 (Modified)
Nitrate-Nitrite	353.2 (Modified)
Ammonia	350.2
MTBE	8021
EDB	504.1

Detection limits for these analyses are described in the Final Action Plan, Appendix A Quality Assurance/Quality Control Plan (July 1997), and the QA/QC Plan Addendum (August 1997).

Sediment Sampling

1. a 0-6" sediment sample will be collected from the same location as each surface water sample after removal of the surficial organic layer (leaves, twigs, bark, and root mass), using a decontaminated hand auger or trowel;
2. the sediment will be placed in a decontaminated bowl, water decanted or drained as needed to ensure a minimum of 30% solids, and homogenized (the VOC sample will be taken directly from the hand auger or trowel prior to homogenization); and
3. Samples will be collected as listed in Table A.8-3.

Sediment samples will be analyzed by the following methods.

Table A.8-2. Surface Water Samples to be Collected

MMR Surface Water Samples			Parameters:	Explosives (EPA 8330)	Inorganics	Cyanide	Cl, SO4, Alk.	NO2/NO3, NH4, Phos.	Metals/ Hardness	Other Analytes:	VOC	SVOC	PCB/Pest.	Herbicide	EDB	MTBE
Location	MMR ID	EPA/Ogden ID	Bottles	2*1LA		1LP	1LA	1LP	1LP		3*40mL	2*1LA	2*1LA	2*1LA	3*40mL	3*40mL
			Pres.	none		NaOH	none	H2SO4	HNO3		HCl	none	none	none	ThioS	HCl
Succonsette Pond	71SW08AXAX01XA	P08AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW08BXAX01XA	P08BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW08CXAX01XA	P08CAA		X		X	X	X	X		X	X	X	X	X	X
Bailey's Pond	71SW34AXAX01XA	P34AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW34BXAX01XA	P34BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW34CXAX01XA	P34CAA		X		X	X	X	X		X	X	X	X	X	X
Round Swamp	71SW27AXAX01XA	P27AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW27BXAX01XA	P27BAA		X		X	X	X	X		X	X	X	X	X	X
Gibbs Pond	71SW35AXAX01XA	P35AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW35BXAX01XA	P35BAA		X		X	X	X	X		X	X	X	X	X	X
Grassy Pond	71SW28AXAX01XA	P28AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW28BXAX01XA	P28BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW28CXAX01XA	P28CAA		X		X	X	X	X		X	X	X	X	X	X
Ox Pond	71SW29AXAX01XA	P29AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW29BXAX01XA	P29BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW29CXAX01XA	P29CAA		X		X	X	X	X		X	X	X	X	X	X
By-Pass Bog	71SW37AXAX01XA	P37AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW37BXAX01XA	P37BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW37CXAX01XA	P37CAA		X		X	X	X	X		X	X	X	X	X	X
J-3 Wetland Area	71SW23AXAX01XA	P23AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW23BXAX01XA	P23BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW23CXAX01XA	P23CAA		X		X	X	X	X		X	X	X	X	X	X
Opening Pond	71SW36AXAX01XA	P36AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW36BXAX01XA	P36BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW36CXAX01XA	P36CAA		X		X	X	X	X		X	X	X	X	X	X
Rod & Gun Club North Pond	71SW25AXAX01XA	P25AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW25BXAX01XA	P25BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW25CXAX01XA	P25CAA		X		X	X	X	X		X	X	X	X	X	X
Donelly Pond	71SW30AXAX01XA	P30AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW30BXAX01XA	P30BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW30CXAX01XA	P30CAA		X		X	X	X	X		X	X	X	X	X	X

Table A.8-2, continued

MMR Surface Water Samples			Parameters:	Explosives (EPA 8330)	Inorganics:	Cyanide	Cl, SO4, Alk.	NO2/NO3, NH4, Phos.	Metals/ Hardness	Other Analytes:	VOC	SVOC	PCB/Pest.	Herbicide	EDB	MTBE
Location	MMR ID	EPA/Ogden ID	Bottles	2*1LA		1LP	1LA	1LP	1LP		3*40mL	2*1LA	2*1LA	2*1LA	3*40mL	3*40mL
			Pres.	none		NaOH	none	H2SO4	HNO3		HCl	none	none	none	ThioS	HCl
Little Halfway Pond	71SW31AXAX01XA	P31AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW31BXAX01XA	P31BAA		X		X	X	X	X		X	X	X	X	X	X
Deep Bottom Pond	71SW26AXAX01XA	P26AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW26BXAX01XA	P26BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW26CXAX01XA	P26CAA		X		X	X	X	X		X	X	X	X	X	X
	71SW26DXAX01XA	P26DAA		X		X	X	X	X		X	X	X	X	X	X
Cranberry Bog	71SW26EXAX01XA	P26EAA		X		X	X	X	X		X	X	X	X	X	X
	71SW26FXAX01XA	P26FAA		X		X	X	X	X		X	X	X	X	X	X
	71SW26GXAX01XA	P26GAA		X		X	X	X	X		X	X	X	X	X	X
Snake Pond	71SW33AXAX01XA	P33AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW33BXAX01XA	P33BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW33CXAX01XA	P33CAA		X		X	X	X	X		X	X	X	X	X	X
Raccoon Swamp	71SW32AXAX01XA	P32AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW32BXAX01XA	P32BAA		X		X	X	X	X		X	X	X	X	X	X
Great Pond	71SW39AXAX01XA	P39AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW39BXAX01XA	P39BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW39CXAX01XA	P39CAA		X		X	X	X	X		X	X	X	X	X	X
	71SW39DXAX01XA	P39DAA		X		X	X	X	X		X	X	X	X	X	X
	71SW39EXAX01XA	P39EAA		X		X	X	X	X		X	X	X	X	X	X
Doughnut Pond	71SW40AXAX01XA	P40AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW40BXAX01XA	P40BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW40CXAX01XA	P40CAA		X		X	X	X	X		X	X	X	X	X	X
	71SW40DXAX01XA	P40DAA		X		X	X	X	X		X	X	X	X	X	X
	71SW40EXAX01XA	P40EAA		X		X	X	X	X		X	X	X	X	X	X
Upper Pond	71SW43AXAX01XA	P43AAA		X		X	X	X	X		X	X	X	X	X	X
	71SW43BXAX01XA	P43BAA		X		X	X	X	X		X	X	X	X	X	X
	71SW43CXAX01XA	P43CAA		X		X	X	X	X		X	X	X	X	X	X
	71SW43DXAX01XA	P43DAA		X		X	X	X	X		X	X	X	X	X	X
	71SW43EXAX01XA	P43EAA		X		X	X	X	X		X	X	X	X	X	X
	71SW43FXAX01XA	P43FAA		X		X	X	X	X		X	X	X	X	X	X
	71SW43GXAX01XA	P43GAA		X		X	X	X	X		X	X	X	X	X	X
	71SW43HXAX01XA	P43HAA		X		X	X	X	X		X	X	X	X	X	X

Table A.8-3. Sediment Samples to be Collected

MMR Sediment Samples			Parameters:	Explosives (colorimetric)	Explosives (EPA 8330)	Inorganics:	TOC	Metals, cyanide, NO2/NO3, NH4, Phos.	Other Analytes:	VOC, EDB, MTBE	SVOC	PCB/Pest.	Herbicide
Location	MMR ID	EPA/Ogden ID	Cont:	8oz	8oz		4oz.	8oz		4 oz.	8 oz.		
Succonsette Pond	71SD08AXAX01XA	D08AAA		X	*		X	X		X	X	X	X
	71SD08BXAX01XA	D08BAA		X	*		X	X		X	X	X	X
	71SD08CXAX01XA	D08CAA		X	*		X	X		X	X	X	X
Bailey's Pond	71SDD4AXAX01XA	D34AAA		X	*		X	X		X	X	X	X
	71SD34BXAX01XA	D34BAA		X	*		X	X		X	X	X	X
	71SD34CXAX01XA	D34CAA		X	*		X	X		X	X	X	X
Round Swamp	71SD27AXAX01XA	D27AAA		X	*		X	X		X	X	X	X
	71SD27BXAX01XA	D27BAA		X	*		X	X		X	X	X	X
	71SD27CXAX01XA	D27CAA		X	*		X	X		X	X	X	X
Gibbs Pond	71SD35AXAX01XA	D35AAA		X	*		X	X		X	X	X	X
	71SD35BXAX01XA	D35BAA		X	*		X	X		X	X	X	X
Grassy Pond	71SD28AXAX01XA	D28AAA		X	*		X	X		X	X	X	X
	71SD28BXAX01XA	D28BAA		X	*		X	X		X	X	X	X
	71SD28CXAX01XA	D28CAA		X	*		X	X		X	X	X	X
	71SD28DXAX01XA	D28DAA		X	*		X	X		X	X	X	X
Ox Pond	71SD29AXAX01XA	D29AAA		X	*		X	X		X	X	X	X
	71SD29BXAX01XA	D29BAA		X	*		X	X		X	X	X	X
	71SD29CXAX01XA	D29CAA		X	*		X	X		X	X	X	X
By-Pass Bog	71SD37AXAX01XA	D37AAA		X	*		X	X		X	X	X	X
	71SD37BXAX01XA	D37BAA		X	*		X	X		X	X	X	X
	71SD37CXAX01XA	D37CAA		X	*		X	X		X	X	X	X
J-3 Wetland Area	71SD23AXAX01XA	D23AAA		X	*		X	X		X	X	X	X
	71SD23BXAX01XA	D23BAA		X	*		X	X		X	X	X	X
	71SD23CXAX01XA	D23CAA		X	*		X	X		X	X	X	X
Opening Pond	71SD36AXAX01XA	D36AAA		X	*		X	X		X	X	X	X
	71SD36BXAX01XA	D36BAA		X	*		X	X		X	X	X	X
	71SD36CXAX01XA	D36CAA		X	*		X	X		X	X	X	X
Rod & Gun Club North Pond	71SD25AXAX01XA	D25AAA		X	*		X	X		X	X	X	X
	71SD25BXAX01XA	D25BAA		X	*		X	X		X	X	X	X
	71SD25CXAX01XA	D25CAA		X	*		X	X		X	X	X	X
Donelly Pond	71SD30AXAX01XA	D30AAA		X	*		X	X		X	X	X	X
	71SD30BXAX01XA	D30BAA		X	*		X	X		X	X	X	X
	71SD30CXAX01XA	D30CAA		X	*		X	X		X	X	X	X
	71SD30DXAX01XA	D30DAA		X	*		X	X		X	X	X	X

Table A.8-3, continued

MMR Sediment Samples			Parameters:	Explosives (colorimetric)	Explosives (EPA 8330)	Inorganics:	TOC	Metals, cyanide, NO2/NO3, NH4, Phos.	Other Analytes:	VOC, EDB, MTBE	SVOC	PCB/Pest.	Herbicide
Location	**MMR ID**	**EPA/Ogden ID**	Cont:	8oz	8oz		4oz.	8oz		4 oz.	8 oz.		
Little Halfway Pond	71SD31AXAX01XA	D31AAA		X	*		X	X		X	X	X	X
	71SD31BXAX01XA	D31BAA		X	*		X	X		X	X	X	X
Deep Bottom Pond	71SD26AXAX01XA	D26AAA		X	*		X	X		X	X	X	X
	71SD26BXAX01XA	D26BAA		X	*		X	X		X	X	X	X
	71SD26CXAX01XA	D26CAA		X	*		X	X		X	X	X	X
	71SD26DXAX01XA	D26DAA		X	*		X	X		X	X	X	X
	71SD26HXAX01XA	D26HAA		X	*		X	X		X	X	X	X
Cranberry Bog	71SD26EXAX01XA	D26EAA		X	*		X	X		X	X	X	X
	71SD26FXAX01XA	D26FAA		X	*		X	X		X	X	X	X
	71SD26GXAX01XA	D26GAA		X	*		X	X		X	X	X	X
Snake Pond	71SD33AXAX01XA	D33AAA		X	*		X	X		X	X	X	X
	71SD33BXAX01XA	D33BAA		X	*		X	X		X	X	X	X
	71SD33CXAX01XA	D33CAA		X	*		X	X		X	X	X	X
Raccoon Swamp	71SD32AXAX01XA	D32AAA		X	*		X	X		X	X	X	X
	71SD32BXAX01XA	D32BAA		X	*		X	X		X	X	X	X
Great Pond	71SD39AXAX01XA	D39AAA		X	*		X	X		X	X	X	X
	71SD39BXAX01XA	D39BAA		X	*		X	X		X	X	X	X
	71SD39CXAX01XA	D39CAA		X	*		X	X		X	X	X	X
	71SD39DXAX01XA	D39DAA		X	*		X	X		X	X	X	X
	71SD39EXAX01XA	D39EAA		X	*		X	X		X	X	X	X
Doughnut Pond	71SD40AXAX01XA	D40AAA		X	*		X	X		X	X	X	X
	71SD40BXAX01XA	D40BAA		X	*		X	X		X	X	X	X
	71SD40CXAX01XA	D40CAA		X	*		X	X		X	X	X	X
	71SD40DXAX01XA	D40DAA		X	*		X	X		X	X	X	X
	71SD40EXAX01XA	D40EAA		X	*		X	X		X	X	X	X
Upper Pond	71SD43AXAX01XA	D43AAA		X	*		X	X		X	X	X	X
	71SD43BXAX01XA	D43BAA		X	*		X	X		X	X	X	X
	71SD43CXAX01XA	D43CAA		X	*		X	X		X	X	X	X
	71SD43DXAX01XA	D43DAA		X	*		X	X		X	X	X	X
	71SD43EXAX01XA	D43EAA		X	*		X	X		X	X	X	X
	71SD43FXAX01XA	D43FAA		X	*		X	X		X	X	X	X
	71SD43GXAX01XA	D43GAA		X	*		X	X		X	X	X	X
	71SD43HXAX01XA	D43HAA		X	*		X	X		X	X	X	X

X - Submit for analysis
* - Submit on Hold

VOC	OLM03.2
SVOC	OLM03.2
Pesticide/PCB	OLM03.2
Herbicide	SW-846 Method 8151
EDB/MTBE	SW-846 Method 8021
Metals & Cyanide	ILM04.0
Phosphorous	365.2
Nitrate	353.2
Ammonia	350.2
TOC	Lloyd Kahn
Explosives Screen	CRREL
Explosives (if detected in screen)	SW-846 Method 8330

Detection limits for these analyses are described in the Final Action Plan, Appendix A Quality Assurance/Quality Control Plan (July 1997), and the QA/QC Plan Addendum (August 1997).

Photograph A: View east from ridge west of Succonsette Pond.

Photograph B: View south from northern side of Bailey's Pond.

Photograph C: View northeast from southeast side of Round Swamp.

Photograph D: View west from eastern side of Gibbs Pond.

Photograph E: View north from southwest side of Grassy Pond.

Photograph F: View west from eastern side of Ox Pond.

Photograph G: View north form southeast shore of By-Pass Bog.

Photograph H: View southeast from north side of Wetland Area South of J-3.

Photograph I: View south from north side of Wetland Area South of J-3.

Photograph J: View north from southern side of Opening Pond.

Photograph K: View north from south side of the Rod & Gun Club North Pond.

Photograph L: View west from east side of Donnely Pond.

Photograph N: View east from west side of Deep Bottom Pond.

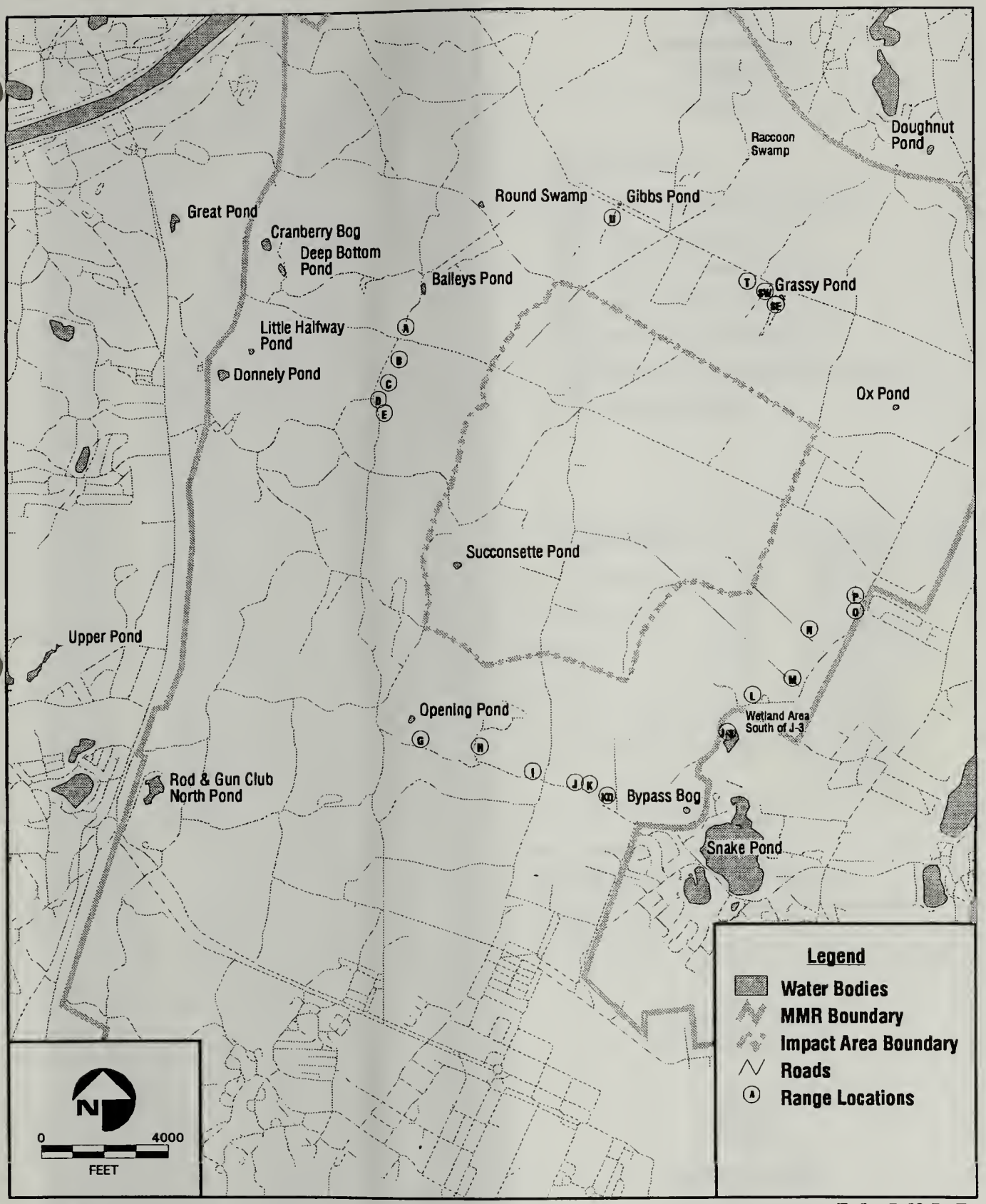
Photograph O: View north toward the northern section of Deep Bottom Pond.

Photograph P: View southwest toward the middle section of Deep Bottom Pond.

Photograph Q: View northeast from southeast side of the Cranberry Bog.

Photograph R: View north from west side of the Cranberry Bog.

Photograph S: View northwest from southeast of Snake Pond.



OGDEN

FIGURE

A.8-1

Pond and Swamp Locations

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/allponds.aml

01/27/98

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 8
Succonsette Pond

0 200
FEET
0 61
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-2

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

DRAFT

278 300 278 400 278 500 278 600 278 700 278 800 278 900 279 000

831 900 831 800 831 700 831 600 831 500 831 400

Avery Road

Burgoyne Road

60

75

34C

B

34B

34A

Burgoyne Road

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 34
Bailey's Pond

N

0 200
FEET
0 61
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-3

DRAFT

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

279 000 279 100 279 200 279 300 279 400 279 500 279 600

832 600 832 500 832 400 832 300 832 200

Jefferson Road

Burgoyne Road

27A

27B

27C

C

silt fence

60

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 27
Round Swamp

N

0 200
FEET
0 61
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE

A.8-4

DRAFT

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 35
Gibbs Pond

N

0 200
FEET
0 61
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-5

DRAFT

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 28
Grassy Pond

N

0 150
FEET
0 46
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE

A.8-6

DRAFT

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

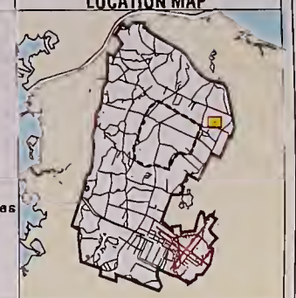
LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP



NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 29
Ox Pond

0 200
FEET
0 61
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-7

DRAFT

/net/puhau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 37
By-Pass Bog

N

0 200
FEET
0 61
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-8

DRAFT

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/crevtemap.aml

281 300 281 400 281 500 281 600 281 700 281 800 281 900

827 600 827 500 827 400 827 300 827 200 827 100

FS12-90MW0022

H I

23A

23B

23C

FS12-90WT0005

Greenway Road

30

45

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 23
J-3 Wetland Area

N

0 200
FEET
0 61
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE

A.8-9

DRAFT

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 36
Opening Pond

N

0 200
FEET
0 61
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-10

DRAFT

/net/pubaa/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

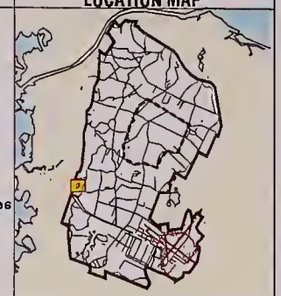
LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP



NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 25
Rod & Gun Club North Pond

N

0 225
FEET
0 69
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-11

DRAFT

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 30
Donnely Pond

N

0 150
FEET
0 46
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-12

DRAFT

/net/pulhal/oshu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

276 800 276 900 277 000 277 100 277 200

831 200 831 100 831 000 830 900 830 800

31A

31B

30

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 31
Little Halfway Pond

N

0 150
FEET
0 46
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-13

DRAFT

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Statsplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 26
Deep Bottom Pond & Cranberry Bog

N

0 225
FEET
0 69
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APP.	INIT.
01/26/98							

FIGURE
A.8-14

DRAFT

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Sample Area 33
Snake Pond

N

0 500
FEET
0 152
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-15

DRAFT

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

281 600
281 700
281 800
832 900
832 800
832 700
32A
32B

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Background Area 32
Raccoon Swamp

N

0 100
FEET
0 30
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-16

DRAFT

/net/pulau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MA66GI6; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MA66GI6

TITLE

Background Area 39
Great Pond

N

0 200
FEET
0 61
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-17

DRAFT

/net/pufau/oahu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Background Area 40
Doughnut Pond

N

0 150
FEET
0 46
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APP.	INIT.
01/26/98							

FIGURE
A.8-18

DRAFT

/net/pnfsu/oabu/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

MMR Groundwater Study

LEGEND

- GPS Wells
- Other Accuracy Source Wells
- Screen Digitized Wells
- GPS Soil Sample Grids
- Screen Digitized Soil Grids
- Storm Water Samples
- Surface Water & Sediment Samples
- Photo Locations

BASEMAP LEGEND

- Impact Area Boundary
- Water Bodies
- Roads
- Paths
- Power/Transmission Lines
- 3 Meter Contours

LOCATION MAP

NOTES & SOURCES

Map coordinates: Stateplane, NAD83, Zone 4151, Meters

ORTHOPHOTOGRAPHY: 1:5000 digital black & white orthophotos
Source: MASSGIS; Resolution: 1/2 meter; Date Flown: March 1997

TOPOGRAPHY: 3 meter contours generated from digital terrain models (DTMs)
Source: MASSGIS

TITLE

Background Area 43 Upper Pond

N

0 150
FEET
0 46
METERS

DATE	REV.	DRWN.	INIT.	CHKD.	INIT.	APPR.	INIT.
01/26/98							

FIGURE
A.8-19

DRAFT

/net/pulau/oalm/mmrdata/mmr/spatial/ogden/plots/figures/createmap.aml

ATTACHMENT A: FIELD GUIDE TO HIGH EXPLOSIVES

Any substance encountered during sampling activities which differs in any way from natural media will be treated as a dangerous substance, carefully removed from the sample, and set aside.

EXPLOSIVES

NAME	DESCRIPTION	REMARKS
BLACK POWDER	BROWN TO BLACK	MANUFACTURED IN GRAINS THAT RANGE IN SIZE FROM SMALLER THAN SALT GRAINS TO GRAINS AS LARGE AS SMALL PEBBLES. HIGHLY SENSITIVE TO IGNITION BY HEAT, FRICTION, FLAME, SPARK. WHEN WET, IT IS CORROSIVE TO MOST METALS.
TNT	LIGHT YELLOW TO BROWN OR GRAY	LIGHTLY CORROSIVE WITH LEAD. USED IN BOMBS, GRENADES, DEMOLITION CHARGES, PROJECTILES. EXUDES AT ELEVATED TEMPERATURES. MODERATELY TOXIC BY SKIN ABSORPTION OR INHALATION.
EXPLOSIVE D	BRIGHT YELLOW TO ORANGE. ALSO CALLED AMMONIUM PICRATE.	RELATIVELY INSENSITIVE. HIGHLY TOXIC BY INHALATION, INGESTION, OR SKIN ABSORPTION
AMATOL	LIGHT BROWN TO YELLOW/MIXTURE OF TNT AND EXPLOSIVE D	SLIGHT HYGROSCOPIC. HAS CORROSIVE EFFECTS ON COPPER, BRONZE, LEAD, BRASS. HIGHLY TOXIC BY INHALATION, SKIN CONTACT, INGESTION.
COMPOSITION B	WHITE TO BROWNISH YELLOW, MIXTURE OF TNT AND EXPLOSIVE D	SLIGHTLY CORRODES COPPER, BRASS, CADMIUM, ZINC. USED IN BOMBS, PROJECTILES, GRENADES, SHAPED CHARGES.
OCTOL	LIGHT BROWN	USED IN BOMBS, PROJECTILES, SHAPED CHARGES.
RDX	WHITE. ALSO CALLED CYCLONITE	SENSITIVE TO IMPACT AND FRICTION.SLIGHTLY CORROSIVE WITH COPPER, BRASS, MILD STEEL, CADMIUM. MODERATELY TOXIC BY INHALATION OR INGESTION.
HMX	WHITE. ALSO CALLED OCTOGEN	SENSITIVE TO IMPACT AND FRICTION. SLIGHTLY TOXIC.
PETN	WHITE	SENSITIVE TO IMPACT. SLIGHTLY CORROSIVE TO BRASS, CADMIUM, ZINC. VERY SLIGHTLY TOXIC.

EXPLOSIVES, continued

NAME	DESCRIPTION	REMARKS
LEAD AZIDE	WHITE TO LIGHT BROWN	VERY SENSITIVE TO IMPACT, FRICTION, SPARKS. CORROSIVE TO COPPER, ZINC. VERY SLIGHTLY TOXIC.
LEAD STYPHNATE	LIGHT ORANGE TO REDDISH BROWN	SAME AS LEAD AZIDE.
MERCURY FULMINATE	GRAYISH	VERY SENSITIVE TO IMPACT, FRICTION, SPARKS. CORROSIVE TO ALUMINUM, MAGNESIUM, BRONZE, COPPER, ZINC, BRASS. HIGHLY TOXIC THROUGH SKIN ABSORPTION, INHALATION, INGESTION. SYMPTOMS RESEMBLE MERCURY POISONING.

PYROTECHNIC AGENTS USED AT MMR

SYMBOL	COMMON NAME	VISUAL IDENTIFICATION	ACTION
CS	NONE	WHITE CRYSTALLINE SOLID	TEAR AGENT
HC	HEXACHORO-ETHANE	WHITE SOLID	SCREENING SMOKE
WP	WHITE PHOSPHOROUS	PALE YELLOW SOLID	SCREEN SMOKE AND INCENDIARY
RP	RED PHOSPHOROUS	REDDISH BROWN POWDER	SCREENING SMOKE

OTHER COMPOUNDS

NAME	PROPERTIES	STABILITY
Picric Acid	lemon-yellow crystalline solid	very sensitive to blows or friction
Tetryl	fine yellow crystalline powder	sensitive to blows or friction
Composition A	unknown	unknown
Composition C3	unknown	unknown
Composition C4	unknown	unknown
Pentolite (50/50)	unknown	unknown
Tracer Compound	unknown	unknown
PBX	unknown	unknown
Ednatol	unknown	unknown
Tetrytol	unknown	unknown